

P147 #12

$$h = -5t^2 + 20t$$

$$= -5(t - 4)$$

$$\begin{aligned} -5t &= 0 \\ t &= 0 \end{aligned}$$

$$\begin{aligned} t - 4 &= 0 \\ t &= 4 \end{aligned}$$

a) the zeroes are $(0,0)$ & $(4,0)$
the football hits the ground at 4 secs.

b) axis of symmetry = $\frac{4+0}{2}$

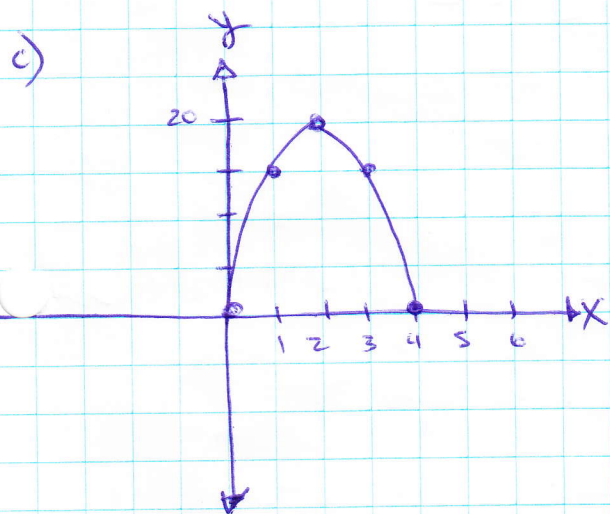
$$x = 2$$

Sub $x=2$ into equation

$$\begin{aligned} h &= -5t^2 + 20t \\ &= -5(2)^2 + 20(2) \\ &= -5(4) + 40 \\ &= -20 + 40 \\ &= 20 \end{aligned}$$

Vertex $(2,20)$

d) the max height the football reaches is 20 m. It reaches this height after 2 seconds.



#13.

$$P = 120x - 60x^2$$

$$= -60x^2 + 120x$$

$$= -60(x - 2)$$

zeroes $(0,0)$ & $(2,0)$

axis of sym = $\frac{2+0}{2}$

$$x = 1$$

sub $x=1$ into equation

$$\begin{aligned} &= 120(1) - 60(1)^2 \\ &= 120 - 60 \\ &= 60 \end{aligned}$$

a) max profit \$60,000

b) 1000 MP3 needed to be sold.

c) 0 & 2000 ^{MP3} are the breakeven pts.

#14. $y = 500 - 5x^2$

time = 0 $y = 500 - 5(0)^2$

$y = 500$

a) ∴ the helicopter is 500m above the water -

b) $= -5x^2 + 500$
 $= -5(x^2 - 100)$

$= -5(x - 10)(x + 10)$

\downarrow \downarrow
 $x - 10 = 0$ $x + 10 = 0$
 $\boxed{x = 10}$ or $x = -10$

can't have
negative time

∴ the raft reaches the
water at 10 seconds

c) $y = 500 - 5(6)^2$
 $= 500 - 180$
 $= 320$

∴ the raft is at a height
of 320m at 6 seconds

d) $100 = -5x^2 + 500$
 $= -5x^2 + 500 - 100$
 $= -5x^2 + 400$
 $= -5(x^2 - 80)$

$= -5(x - 8.9)(x - 8.9)$

∴ approximately 8.9 seconds

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#13. y-intercept (0, 5)

zeros (50, 0) & (-250, 0)

$$y = a(x - 50)(x + 250)$$

$$5 = a(0 - 50)(0 + 250) \quad \text{sub in y intercept}$$

$$5 = a(-50)(250)$$

$$\frac{5}{-12500} = \frac{a(-12500)}{-12500}$$

$$a = -\frac{1}{2500}$$

$$y = -\frac{1}{2500}(x + 250)(x - 50)$$

#14. $(80 - 5x)(10 + x) = R$

at $R = 0$

$$(80 - 5x)(10 + x) = 0$$

$$80 - 5x = 0$$

$$\frac{80}{5} = \frac{5x}{5}$$

$$x = 16$$

$$x + 10 = 0$$

$$x = -10$$

axis of symmetry

$$x = \frac{16 + (-10)}{2}$$

$$x = \frac{6}{2}$$

$$x = 3$$

∴ ticket price is \$13

$$= (10 + x)$$

$$= (10 + 3)$$

$$= 13$$

$$15. a) (700 - 10x)(5 + 0.10x) = R$$

$$\begin{aligned} \downarrow \\ 700 - 10x &= 0 \\ 700 &= 10x \\ \frac{700}{10} &= \frac{10x}{10} \\ x &= 70 \end{aligned}$$

$$\begin{aligned} \downarrow \\ 5 + 0.10x &= 0 \\ 0.10x &= -5 \\ \frac{0.10x}{0.10} &= \frac{-5}{0.10} \\ x &= -50 \end{aligned}$$

$$\begin{aligned} \text{Axis of symmetry} &= \frac{70 - 50}{2} \\ &= \frac{20}{2} \\ x &= 10 \end{aligned}$$

$$\begin{aligned} b) &= (700 - 10(10))(5 + 0.10(10)) \\ &= (600)(6) \\ &= \$3600 \end{aligned}$$

∴ the max daily revenue is \$3600

$$c) 600$$

∴ 600 packages of batteries are sold to maximize profit.